



CITY OF
CINCINNATI

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ODOT LPA Certification

APPENDIX J

CONSTRUCTION

INSPECTION MANUAL

**CITY OF CINCINNATI
DEPARTMENT OF TRANSPORTATION & ENGINEERING**

**CONSTRUCTION MANAGEMENT SECTION
CONSTRUCTION
INSPECTOR'S
MANUAL**

**Introduction and Sections 1 - 6
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Introduction

A Construction Management (CM) organization must adopt standard operating procedures in order to promote uniformity and efficiency. The use of consistent CM and Inspection practices as provided in this Manual and the CM Manual will be beneficial.

Construction Engineering and Inspection

Construction engineering and inspection services provided during the construction phase of a project will usually include monitoring of the construction work through inspection and testing, monitoring progress against the construction schedule, checking and recommending interim and final payments, administration of changes, maintaining and filing records for audits, and providing documentary records that the project has been built in accordance with plans and specifications. The management will usually include a Construction Engineer (CE) who will be supported by inspectors. The CE and CI make up the construction management team and must work together for the success of the project. The Construction Inspector works under the direction and supervision of the Construction Engineer. The Construction Inspector (CI) plays an important role in effective Construction Management.

Role and Responsibility of the Construction Inspector

The CI's primary function should be to observe and monitor (but not to certify or ensure) that the project is built in accordance with the plans and specifications and in accordance with sound engineering and construction practices and that the completed work is documented, recorded and properly paid for. This Manual describes the duties involved in the construction inspection of projects. This is not a complete list of duties and responsibilities but offers guidance to the CI as to what is expected of them.

The CI is expected to follow all City of Cincinnati standard operating procedures, rules, and regulations.

Duties of a Construction Inspector (CI)

- Observe, monitor, and record all the construction activities associated with the contract assigned to them
- Communicate with the contractor as to what work is planned
- Be familiar with the plans, specifications and method of measurement for the work that is being performed
- Be familiar with permit requirements
- Complete daily reports
- Inspect the work and materials incorporated
- Record quantities for completed work
- Check and verify layout
- Schedule and monitor testing
- Attend progress and related job meetings
- Report any observed safety infractions and make sure they are reported to the contractor and to the CE
- Identify and record any subcontractors that are on the project
- Maintain a set of update, contract drawings and as-built information
- Communicate with affected parties, including utilities, residents, businesses
- Keep photographic records
- Monitor the contractor's short-term schedules
- Identify and report to the CE any contract irregularities that may require a change order or contingency spending
- Notify the CE immediately of any potential claims
- Identify and notify of any non-compliance work
- Do a final inspection
- Do a one-year warranty inspection

Section 1.0

General Duties

Observe and monitor all major construction activities for the contract assigned to them

General: The CI is the eyes and ears of the City for administering construction contracts. The CI should know what the contractor is doing at all times. The CI can offer suggestions on means and methods of construction but cannot direct the contractor how to do the work.

Workday: The CI's normal workday should be the same as the contractor's. The CI should plan on arriving at the job when the contractor plans on starting work for that day and should do a final inspection just before the contractor quits for the day. The CI's time starts when they arrive at the job or the field/district office. The CI should be on site and observe all major activities.

Overtime: On most construction jobs there is the need to work overtime. The CI should plan to work whatever overtime is needed to observe the critical work items being performed by the contractor. If the CI cannot work the overtime to cover the construction activities they should contact the CE as soon as possible and work with them to get someone to replace them. The CI should call the CE on a daily basis to report all overtime being worked. Not all construction activities require a CI to be present full time. Items like watering sod or removing curing blankets may not need an inspector present, while items like asphalt paving and concrete pours are critical and require the CI's presence. The CI should consult with the CE to have a thorough understanding of what they need to monitor.

In general, items being incorporated into the final product and pay items should be monitored.

Communicate with the contractor

The CI is the first line of communication with the contractor. The CI needs to establish a means of open and honest communication with the field supervisors and needs to know what work the contractor is doing and is planning. At the start of a contract the CI needs to know who is in charge of field activities for the contractor and their subcontractors. The CI should exchange office, mobile and emergency phone numbers with these people.

The CI should meet with the contract representative on a daily basis to review the work he plans to do in the next 48-hour period. The CI should meet and review the contractor's two-week work schedule at least once a week.

Most written communication should go through the CE to the contractor or from the contractor to the CE. However, there are some instances when the CI needs to send something directly to the contractor. The CI should notify and copy the CE as soon as possible when they do this. Any verbal communication significant to the administration of the contract should be recorded on the inspector's daily report.

The CI will ensure that inspection of the work is so organized as to support the Contractor's schedule and coordinate with the CE so that inspection forces are available and sufficient to meet the schedule. Every effort should be made to cooperate with the Contractor so that inspection activities will dovetail with the Contractor's work.

The CI should conduct his relations with the Contractors in a professional, cooperative, and business-like manner. Absolute integrity is required and excessive fraternization with key personnel of the Contractor's staff must be discouraged. **The acceptance of gifts or favors from Contractors by any member of the Construction Management staff is strictly forbidden, regardless of their size or value.**

Be familiar with the plans, specifications and method of measurement for the work

In order for the CI to inspect the ongoing work he needs to be thoroughly familiar with the plans, specifications and method of measurements for each specific item of work. Before the contractor starts an item of work the CI should read the ODOT Construction and Material Specification, the City of Cincinnati Supplement to the ODOT specification, the relevant section of this manual and any contract special provisions and manufacturers' instructions relative to the work to be performed. Most contract items of work correspond to a specification reference number. The CI should understand completely the description of work and method of payment under that reference item. If there is any doubt as to what should be done or how the item is paid the CI should ask the CE for clarification.

The CI should review all plans including any related standard drawings and approved shop drawings for the items of work being performed. Although it is solely the contractor's responsibility to build the project per plans, a well-informed CI can catch many mistakes before the work is done and can avoid costly redoing of work and delays. The CI should bring any deficiencies found to the attention of the contractor and the CE immediately. The CI should check the contractor's operations on a regular basis to ensure that he is performing the work in accordance with plans and specifications. The CI should not give any direction to change or deviate from the plans without first consulting with the CE. The CI should immediately contact the CE if it appears that the plans are in error or the conditions of the job are different than shown.

The CI will be called upon to assist in the interpretation of plans and specifications and can offer valuable insight on methods and techniques of construction. They must be careful not to direct the Contractor in means, methods, techniques, sequences, or procedures of construction or to make recommendations. Any advice requested and offered must be qualified with the statement that the Contractor alone is responsible for the construction of the work.

By contract, the most specific specification or drawing governs over general specifications and details. In general, the hierarchy is as follows: contract special provisions and drawings; contractors and manufactures shop drawings and catalog cuts sheets; City Standard Drawings and City Supplement to ODOT CMS; ODOT standard drawings and CMS. When reviewing specifications and drawings the CI should start with the most specific.

Be familiar with permit requirements

The CI should be aware of any permits and special inspection requirements that are required as part of the contract and should not allow work to begin until the permits are obtained. As a general practice all work described in the contract within the right of way does not require the contractor to obtain a DOT&E permit. Water mains, sanitary sewers, telephone, gas, and electric facilities installations require special inspections by the owning agency. Any deviations from the contractual maintenance of traffic conditions need a DOT&E street blocking permit. All work outside the right of way usually requires a Building permit and falls under the jurisdiction of the Building inspector. All work performed by a utility company within the right of way requires a street opening permit and the CI should coordinate inspection with the DOT&E Right of Way Management inspectors.

A CI may be assigned the inspection of a DOT&E permit. The CI should follow the procedures for inspecting and documenting as required by the DOT&E Right of Way Management Section for permits.

Complete Inspector's Daily Reports

It is mandatory for the CI to fill out an Inspector's Daily Report (IDR), one for each contract day and one for each contract they are working on. Even if there is no work performed that day an IDR should be filled out. The CI should use standard IDR forms. The CI should attempt to complete the IDR the same day the IDR is reporting on. At the latest all IDR's need to be completed by the end of the following day. The IDR will constitute the

official daily diary of the project. It will provide the most comprehensive record of the installation of the work of the project, the weather, and other conditions affecting the work. The IDR must adequately describe the day, date and contract day number, (determined usually by the Notice to Proceed, i.e., Day #1 is the first day after date of Notice to Proceed), weather conditions and temperatures, personnel and equipment on site, work performed, instructions given or received, problems encountered, delays and disruptions, materials received, quantities of work installed, visitors to the site and other relevant information. As this is one of the principal forms of documentation on the project, great care should be taken to be thorough and accurate when completing the IDR. The IDR should not be viewed as an exception report, detailing only the negatives, but rather as a definitive report that accounts for all construction work and practices observed by each inspector, whether or not they are in compliance with the contract documents. It is permissible to commend good work and extra efforts as well as record deficiencies. It is required that the IDR be made out using ink pens, not pencil that can fade and smudge over time. The IDR shall be filled out on the City's standard form per the instructions attached.

All original IDR's including all calculation sheets, tickets, certifications and testing slips should be given to the CE at a minimum of every two weeks to be filed in a secure location.

Inspect the work and materials incorporated

The CI should physically inspect and verify that the project is being constructed in accordance with the plans and specifications, in compliance with the terms of the contract and/or in accordance with sound engineering and construction practices. The CI should observe and measure as many of the contractor's activities as possible. It is important for the CI to observe any work during installation that will be covered up or not accessible once completed. If possible, the CI should be present for all concrete pours. Work items of high dollar value, for example asphalt paving, should be given special attention and the CI should be present during the entire operation if possible and talk to the CE if additional resources are needed.

The CI should inspect all materials delivered to the worksite and confirm that the materials meet the specified requirements. All incoming materials should have required documentation including certification that materials have been manufactured/processed in accordance with specified quality standards and passed all required inspections and tests. The CI will check all such documentation and forward it to the CE for filing. Storage and protection of all delivered materials shall be checked periodically to ensure that there is no deterioration of the materials prior to incorporation in the work. The CI should try to identify any deficient material before installation.

Offsite inspections may be required. The CE and the CI should schedule with the Contractor any offsite inspections needed. Inspectors shall provide details of inspections, tests, sampling performed, and conditions observed on the IDR. Status of progress in fabrication/production and conformance with the required schedule should be noted and the CE informed of any potential for delays due to quality or production problems.

The CI should ensure that all necessary testing is performed on all items that are to be incorporated into the work. Record all testing done on the IDR.

Record quantities for completed work

Recording measured quantities and completed work is one of the most important duties of a CI. Quantities, location and the related pay item for each activity of work completed needs to be accurately recorded on the IDR. The CI needs to maintain a Monthly Tally Sheet for each contract pay item. For Street Rehab contracts, quantities need to be kept per street. The CI should review their method of recording and tallying quantities with the CE before a job starts. The CE should provide the CI with a monthly estimate sheet including all contract pay items. The CI should work with the CE to complete an estimate of quantities completed on a monthly basis. The CE should establish with the contractor a cut-off date for each month's quantities. This will be used to calculate the amount due a contractor each month. The amount paid to a contractor on a monthly basis is an estimate of completed work and

can be adjusted if a mistake is made; however, the CI should take care in preparing a monthly estimate to provide as accurate information as possible. Monthly tally sheets need to be kept in a secure location in the field or district office.

For any item of work where there is no pay item, the CI should notify the CE as soon as possible. The CI should keep Force Account Records for any of these items or for any item where the contractor or the CI feels that the existing conditions are so different from the plan that the contractor could not have planned for in his bid. Force Account Record sheets need to be as accurate and detailed as possible. The CI should get the contractor's representative to sign off on any force account record kept.

The CI should keep a clean set of contract drawings to use to record as-built information. The as-built set of drawings should include any changes made to original contract drawings. Dates of when items are completed should not be put on the as-built set. The CI should compare on a weekly basis their set drawings with the contractor's information.

Construction Inspector's General Duties and Responsibilities

1. General

- Get to know the plans and specs
- Be equipped with the tools needed to perform their duties: tape measure, measuring wheel, ruler, safety equipment, relevant standard drawings and specifications, relevant supplemental specification, City of Cincinnati policy, procedure and safety manuals, calculator, pen, scale, camera, cell phone, a sufficient supply of relevant forms, and any other relevant specific job-related equipment
- Look for potential conflicts with plans, specs and existing conditions
- Check with the contractor to understand his plan and resources to complete the work
- Check with the contractor on access, storage, and dumping areas with approved dumping permit
- Talk to the contractor about planning ahead for any tie-ins, shutdowns and tests required
- Verify the contractor has checked key elevations before installing permanent work. If necessary have the City surveyors check
- Review material and equipment installation against the approved shop drawings
- Verify approved shop drawing and contract drawings are used for construction
- Keep Force Account Records for all items of dispute or for items of work where there is no pay item
- Assist in preparing punch list
- Do a final inspection assuring all punch list items are complete
- Do a one-year warranty inspection
- Be familiar with permit requirements and other agencies' inspection requirements
- Monitor the contractor's short term schedules
- Keep a set of as-built drawings and review contractor's as-built information on a weekly basis
- Verify traffic control is per installed per plan

2. Pay quantities

- Assist the CE in verifying the Contractor's percentage of work complete for base contract work and change orders
- Ensure that the quantities for payment agree with the work in place and are documented on the IDR
- Verify quantities for stored materials for which payment is being requested
- Complete monthly tally sheets for all items of pay
- Assist the CE in preparing a monthly partial estimate

- Get from the CE a copy of the designer's take-off and quantity calculation sheets. Use these to verify bid quantities match actual work complete

3. Inspector Daily Reports (IDR)

- Complete IDR daily in ink pen
- The IDR should be accurate and factual and have no erasures. Cross out mistakes and initial corrections (no white out)
- Record rainfall and weather conditions
- Record who was representing the contractor on site
- Describe progress made
- Record any problems and the cause for (example, contractor's equipment failures)
- Record all pay items and quantities completed
- Record any change order work done and note if any force account records were kept
- Record any verification of line and grade and when contractor's as-built information was checked
- Record total work force on site including all subcontractors
- Record all equipment on site including idle equipment
- Record location and quantity of rock and unsuitable material encountered, and keep forced account records
- Record any changed existing conditions, keep force account records if needed
- Record the delivery of materials. Get copy of certifications
- Record any testing done and how long testing agent was on site
- Record any safety concerns
- Record any visitors
- Record surveying activities
- Record any relevant conversations with property owners or businesses
- Record contractor's and inspector's work hours

4. Preparatory inspection meetings

Before the beginning of each segment of work participate in quality control meeting with the contractor. The following topics should be discussed:

- Contract requirements for the work activity
- Quality standards and codes
- Action items required before the work can start, e.g. approved shop drawing, samples, mock-ups, permits
- Testing requirements
- Contractor's person in charge of specific work items
- Safety and environmental requirements
- How do outstanding RFIs, RFPs and Change Orders affect planned work
- Discuss any layout needed

5. Utilities

- Check with the contractor to verify that the utility owner has been notified of the intended work. The Contractor shall contact the Ohio Utility Protection Service at 1-800-362-2764, 48 hours prior to any excavation
- Verify any proposed construction is marked in white paint
- Check to see if the general area of excavation is clear of marked utilities and there are no conflicts with proposed work. Compare with what is shown on the plans
- Verify the contractor's method of uncovering utilities
- If damage to a utility results from the contractor's work, see that the owner is notified immediately and the damage is not covered up

6. Notices and requests

- *Verify and record that notices have been made per the contract requirements, e.g. driveway replacements and no parking restrictions*
- Verify other agencies that have inspection requirements have been notified as to start of work
- Verify release of real estate parcel and temporary construction easements
- Verify Police and Fire District is notified of major access changes or road closures

7. Material certificates

- Check to ensure that delivered materials for which certificates of compliance have been approved have a copy of the certificate included with the shipment and contain the information per City Supplemental Spec Section 106
- Notify the CE of any deviations found between the materials delivered and the certificates provided
- Attach material certificates to the IDR

8. Photographic records

- Photograph any special event worthy of extraordinary attention and note on the IDR photos were taken
- Photograph any condition that differs from what is shown on drawings
- Take random area-wide photographs to document overall conditions. Select a location that covers a wide area of construction
- Select a convenient place near each major part of the project and photograph the work in progress regularly from that same location
- Signs of inactivity are just as important as activity photographs
- Ensure that you are close enough to the work to show detail in the photograph and that the scale of items in the photograph can be easily determined: Use people, tape, hardhat, for reference
- Label and give all photographs to the CE to put in the project file
- Photograph any existing damaged conditions or damage caused by a contractor
- If the camera has a data back make sure that it is properly set

9. Testing services

The City has service contracts with pre-approved testing firms. These contracts need to be administered just like any other City contract. Money for specific services needs to be certified and the work done needs to be verified and recorded.

- Review and discuss with the CE contract documents for testing requirements
- Get name of testing agency and contact from the CE
- Talk to the contractor on a daily basis and decide what testing is needed for the next day's work
- Call testing agency 24 hours in advance for any testing needed
- Log on the IDR any test performed that day
- Coordinate with the CE and Contractor any off-site testing
- Pay items should be recorded on the IDR

10. Personal safety

- Clothing: long pants, hard hat, shirt, and work boots are minimum
- Wear eye protection when around: grinding, chipping, cutting and air blowing operations, welding
- Wear ear protection when near jackhammering, pile driving or loud equipment
- Wear dust respirators when around flying dust particles
- Safety harness must be worn when in presence a fall hazard
- The CI should have a first aid kit in his car at all times
- Do not enter any confined space without proper equipment and training and obtaining the appropriate permit
- Wear safety vest when needed
- Report any personal injuries immediately to your supervisor and fill out any required forms
- Be familiar with the requirements in the City of Cincinnati's Employee Safety Instruction Manual (Green Book)

11. Contractor's safety

- Observe but do not direct the contractor's safety operations
- Know the name and contact number for the contractor's field safety person
- Bring to the contractor's attention any unsafe conditions you notice and record on the IDR
- Issue a stop work order for any contractor's operation you feel puts an employee or citizen in immediate danger; notify the CE immediately
- Avoid putting yourself in any unsafe condition
- Record any accidents or injuries on the IDR
- Observe that the contractor has Material Safety Data Sheets (MSDS) for any required materials
- Have available and be familiar with the contractor's specific site safety plan

12. Traffic control

- Review contractor's traffic control plan and check to see that it is in place
- A street blocking permit is required for any lane closures not identified in the contract
- Meet with the contractor and review his plan for putting traffic control in place
- Check to see that flaggers are properly equipped: vests, paddles, signs
- Ensure off-duty police are in place where required
- Check routinely: warning signs, barricades, lights, striping, cones and drums are being maintained, and at minimum check before leaving the site at the end of the day. Note on IDR
- Verify tenants and owners adjacent to the work site have been notified well in advance of any operation that may impair access
- Notify Traffic Engineering and the CE of any deviations in the approved traffic control plan or if the CI has any question or suggestion about the traffic control installed
- Make sure all traffic control equipment and signs are removed at the end of the project
- Have available and be familiar with the requirements of the relevant standard traffic control manual
- Verify Police and Fire Districts have been notified of any major change in traffic patterns

13. Temporary facilities

- Assist the contractor in selecting a location for the field office, get approval from the CE

- Verify the field office meets minimum contract requirements
- Upon completion ensure that all temporary facilities have been removed, all trash and debris are cleaned up and the area is graded to proper elevations
- Work with the contractor to get temporary utilities hooked up in a timely manner

14. Cleaning

- Check to ensure all work areas are being kept clean on a daily basis
- Inspect the worksite on a regular basis for hazardous conditions and note on the IDR
- Do a final inspection to ensure the entire site is clean of all construction debris
- Ensure that spillages of materials onto roadways, walking surfaces, and private property are removed immediately
- Ensure proper dust control is used when sweeping streets and sidewalks with mechanical equipment

15. Layout

- On most City contracts the DOTE is responsible for layout. The CI should get from the CE the name of the surveyor responsible for the contracts assigned to them
- The CI should talk with contractor frequently to find out what layout will be required and when it is needed. Record on IDR when layout is requested
- The CI will arrange with the surveyor for the layout to be done. It is important that timely layout be done so as to not delay the contractor. Record on the IDR when the surveyor is contacted and when the layout is done
- The CI should meet with the surveyor once he arrives on site and go over the layout needed. The CI is responsible to know what the survey stakes and markings say and how to interpret them compared to the plan drawings; ask the surveyor or CE to explain if not sure. The CI should also notify the contractor when the surveyor arrives on site.
- The CI should check the contractor's work against the survey stakes on a regular basis. Record on the IDR this was done
- For critical items such as a bridge column the CI may want to contact the surveyor to verify line and grade of the contractor's formwork before the concrete is poured
- Where line and grade is critical (example: paving a flat street) the CI should call the surveyor for assistance

16. Project records

- The IDR is the most important record of the entire contract. It is desired that the CI turn in the original IDR and all the attachments to the CE on a daily basis. However, this not always possible and at a minimum the IDRs should be given to the CE bi-weekly. The CI is responsible to keep their IDRs in a secure place until they are turned in to the CE
- The CI is also responsible to keep the Monthly Tally Sheets and keep them in a secure place
- The CI's as-built drawings shall be kept in the field or district office; they are not to be removed. They should be kept clean and in good condition
- The CI and CE should review the contract files before a job begins. They need to determine where the appropriate storage place for the contract files should be
- At the end of the contract the CI should give the CE **ALL** their files before the contract is closed out

17. Public relations

- The CI usually has direct contact with the property owners affected by the contract they are assigned to. The CI should make himself available to answer any questions and address any concerns the property owners may have. A simple conversation may save much aggravation in the long run. Be proactive not reactive
- The CI is viewed as a representation of all City employees when they are in contact with the general public. The CI should treat the general public with respect

- The CI should not talk to the media; refer them to the CE. Immediately notify the CE if approached by any type of media
- The CI should respond to complaints as soon as possible

Section 2.0

Site Work

1. Clearing and Grubbing (ODOT 201)

- Consists of clearing, grubbing, scalping, removal of trees and stumps, and removing and disposing of all vegetation and debris within the project limits (unless removal of trees and stumps is a separate pay item) (201.01)
- 201 Removal of trees and and/or Stumps may be a separate pay item; if not it is included in 201 Clearing and Grubbing (201.01)
- Contractor shall scalp areas where excavation or embankment will be performed (201.04)
- Scalping includes removal of roots, sod, grass, decayed vegetable matter from the surface of the ground (201.04)
- Scalping under 201 is not intended to include topsoil removal; additional material beyond roots, sod, etc. is paid under 203 (201.04)
- Confirm the limits of clearing and ensure the area is clearly marked and document existing conditions with photographs as needed
- Check that trees and shrubs that to remain are clearly marked for identification and protection
- Check to see the Contractor has located and marked existing utilities
- Verify the Contractor is complying with disposal requirements
- Burning and/or burying of debris is not permitted
- Verify the Contractor has protected survey benchmarks and offset stakes
- Verify existing elevation conditions with surveyors after scalping
- Before moving equipment across culvert pipe, waterlines ducts, other utilities, make sure the contractor has properly filled or supported the pipe
- Check to ensure the Contractor does not stockpile earth within the root zone of trees indicated to be saved

2. Demolition

- Check to see demolition plan and procedures have been submitted and approved
- Demolition outside the right-of-way requires a building permit
- Verify that the plan includes items such as safety, fencing, dust control, rodent control, disposal and a schedule
- Verify environmental abatement that is required has been performed
- Verify premises are uninhabited
- Verify utilities have been turned off and properly disconnected
- Verify that water sprinkling is used to control dust without causing run-off or icing
- Check to see rubble is broken up to appropriate size in accordance with contract
- Contractor must submit an executed copy of permission to dump from the property owner per ODOT 203.05 and City Supplement 105.151 for each dumpsite. The contract or permission statement must recite that the waste materials are not the property of the City of Cincinnati. It must also state that the City of Cincinnati is not a party to that permission statement and that the Contractor will hold the City of Cincinnati harmless from any claim that may arise from the permission statement
- Verify final restoration requirements have been met

3. Removal of Structures and Obstructions (ODOT 202)

- Consists of removal as directed by specs, salvaging or disposal, and backfill of voids incidental to the removal (202.01)
- If no 202 Item exists, removal shall be paid under 203 Excavation (202.01)
- Copy of permission to dump ODOT 203.05 and City Supplement 105.151 required for disposal
- Check 202.02 to 202.09 of ODOT and the City Supplement for specific removal requirements for different type of structures
- Pipes and sewers should be plugged at each end and filled if they are to remain
- Check City Supplement 202.021 for specific plugging and filling requirements and pay items
- Pavement, walk, curbs etc. that are partially removed must be neatly cut prior to removal, with pavement and walk removed to the nearest joint
- Check City Supplement 1121 and 1122 for filling or removing CWW facilities
- Be familiar with the method of payment directed by contract: "lump sum," "cubic yard," "each," etc.

4. Disposal of Materials

- Verify the Contractor's plan for disposal of materials
- Plan for disposal of materials must include written permission from the owner if the site meets the requirements of ODOT 203.05 and City Supplement 105.151, and a cut/fill permit if site is within the City of Cincinnati
- Contractor must submit an executed copy of permission to dump from the property owner per ODOT 203.05 and City Supplement 105.151 for each dumpsite. The contract or permission statement must state that the waste materials are not the property of the City of Cincinnati. It must also state that the City of Cincinnati is not a party to that permission statement and that the Contractor will hold the City of Cincinnati harmless from any claim that may arise from the permission statement
- City Supplement 105.151 requires a written certification at completion
- City Supplement 105.151 requires written permission from the owner of the borrow site as well
- Permission statement should also include ingress/egress plan, dust control plan, erosion/sediment control plan, and a restoration plan
- Contractor must obtain any other required permits from the appropriate jurisdiction prior to work
- Verify dumping procedures and log on IDR

5. Earth Work

General

- The method for arriving at pay quantities for excavation, embankment and/or borrow should be agreed to in advance by the Contractor and the Engineer/Inspector
- Payment for excavation, embankment and/or borrow is usually based on the plan quantities, plus or minus any measured deviations, such as undercuts
- Plans should provide cross sections along with the calculated volume for each cross section so that daily quantities can be calculated from station to station
- If cross sections/volumes are not included on the plans, notify the Engineer so that either the quantities calculated by the designer can be obtained and/or a before and after survey of the excavation, borrow or embankment area can be made
- Earthwork consists of roadway excavations (cuts) and roadway embankments (fills)
- If pavement is to remain smooth and stable for years of service, the earthwork on which it is built must be stable and must furnish uniform support

- Check to ensure the testing consultant is prepared for fill placement, i.e. Proctor tests have been performed, gradation tests have been performed, etc.
- Having a "Proctor" density test of bag sample of fill/backfill or base material provides the Maximum Theoretical Density (MTD) at the optimum moisture content
- All subsequent in place density tests are measured as a percentage of the MTD
- If the compaction of a material is not reaching the specified %MTD, the moisture content may have to be adjusted to bring closer to optimum either by diskings the material to dry it out and lower the moisture content, or by adding water to raise the moisture content
- Set density test and/or proof roll observations in advance
- Compaction of embankments and subgrades are measured as a percentage of the MTD and range from 98% to 102% of the MTD (203.12)
- Review contract documents for earthwork requirements, i.e. compaction, moisture content, minimum dry density, etc.
- Coordinate between the Contractor and the testing consultant to ensure testing frequency is met
- Make sure the correct compaction equipment is used and that enough compactive effort is being exerted on lifts that are not tested
- Any tests that fail, make sure area is reworked until it passes before placing additional fill
- Contractor is required to provide drainage for the excavation to ensure thorough drainage of the excavated area or subgrade
- If underdrains are needed, and they are not provided for in the plans, consult with the CE for remedy

Excavation

- 203 Excavation and Embankment consists of excavation, disposal or storage of all materials not being removed under some other item, preparation of areas upon which an embankment will be placed, and construction of embankment to compaction requirements (203.01)
- If embankment is not a separate pay item, payment for excavation shall be paid under 203 Excavation, including Embankment, which includes placing suitable excavated material in embankment (203.01)
- If embankment is a separate pay item, excavation shall be paid under 203 Excavation, not including Embankment, and embankment under 203 Embankment
- If the contract does not separately pay for 201 Clearing and Grubbing, 201 Removal of Trees and/or Stumps, or 202 Removal of Structures and Obstructions, they are considered subsidiary obligations of 203 (203.01)
- If excavation uncovers bones, artifacts, potentially significant historical or archeological objects, cease operations immediately and notify the Engineer (203.04)
- If excavation uncovers abnormal material such as; drums, tanks, etc., or unusual odors or colors of material, contact the CE immediately. The work shall cease with equipment remaining in place. Fill out Force Account sheets for down time and the contractor shall cordon off the area until such abnormalities can be investigated by proper parties (203.04)
- If excavating the unsuitable material two to three feet and suitable material is not found, consult with the CE for the appropriate remedy: geofabric, geogrid or other methods must be considered
- Payment can be made for extra fill needed above through contingency items such as Special Fill"; consult the specifications
- Subgrade under new pavement shall be compacted according to type of material and the depth of the subgrade compaction required (203.12)
- In pavement widening construction, 203 shall include cutting away the old pavement along a neat line as directed by the Engineer, and removing and disposing of the old pavement (203.04 (f))

- Compare calculated quantities with the Contractor's truck count on a daily basis to mitigate discrepancies in quantity

Embankment

- Embankment is a structure consisting of soil, granular material, shale, rock, or random material, constructed in layers to a predetermined elevation and cross section (203.02)
- Embankments shall be constructed only of suitable material and shall be properly compacted according to the type of material being used and its location in the embankment (see 203.07-.12); involvement of the testing agent is critical
- Borrow is material obtained from approved sources, outside the right-of-way, required for the construction of embankments (203.03)
- Material from outside the right-of-way used in embankment is considered to be borrow even though it is not paid for as borrow
- Have borrow source material checked for suitability by a Proctor Test
- Follow guidelines in Section 2.4 of this manual for property owner's permission, etc.
- Embankment to be placed in 8" lifts
- 203 Embankment item includes furnishing suitable material from sources other than excavation if needed (203.01)

Subgrade

- Subgrade under new pavement shall be compacted according to type of material and the depth of the subgrade compaction required (203.12)
- Areas of subgrade that are soft due to no fault or neglect of the Contractor shall be cut out and replaced with suitable material and paid through the appropriate excavation/embankment item(s) (203.13 c)
- Areas of subgrade that are soft due to fault or neglect of the Contractor to provide drainage shall be cut out and replaced with suitable material at no expense to the City of Cincinnati
- Large areas of subgrade that are soft due to no fault or neglect of the Contractor should be examined by the Engineer and/or Geologist to determine an appropriate remedy which may include geofabric and/or geogrid
- Geofabric and or geogrid should be included as contingency items in the contract in case of soft subgrade
- Proof rolling may be ordered to confirm subgrade or subgrade and subbase stability and should be included as a contract pay item
- Close inspection throughout proof rolling is necessary to observe the effects of the rolling and to mark locations of soft subgrade for correction
- Inadequate stability due to rolling is indicated by deflection, cracking or rutting of the surface of the subgrade
- The failure criteria for proof rolling is not as straightforward an answer as it might seem: failure is based on experience and if in doubt, consult with the CE
- If the CI is inexperienced in identifying inadequate subgrade from proof rolling, they should consult with the CE or another inspector to observe the operation with them until they feel comfortable in identifying problems
- Proof rolling should be done as soon as possible after regular compaction, before the subgrade has a chance to become too wet or too dry
- Drying or wetting of subgrade as described below shall be at the direction of the Engineer (203.11)
- If the compaction of a material is not reaching the specified %MTD, the moisture content may have to be adjusted to bring closer to optimum either by disking the material to dry it out and lower the moisture content, or by adding water to raise the moisture content

6. Soil Erosion and Sediment Control

- Place according to the plans or as ordered by the Engineer before any clearing and grubbing, excavation, embankment, and/or borrow activities begin. Maintain for life of the contract
- Early seeding of slopes is the most effective erosion and siltation control
- Contractor should schedule his clearing and grubbing, excavation, embankment and borrow activities commensurate with his abilities to install permanent erosion control measures
- When seeding and mulching of significant areas is not performed in stages as directed by the Engineer/Inspector, work on earthwork items may be suspended until the exposed erodable areas are seeded and mulched
- Check erosion control after every significant rainfall or at least once a week and re-establish as necessary
- When suspension is necessary, the Contractor should be notified in writing, detailing deficiencies and necessary action required
- Maintain records of inspections in the IDR
- In accordance with 207.04, the Engineer/Inspector may withhold progress payments until proper control is achieved
- Verify removal at completion of project

7. Site Signage

- Inspect all construction signage periodically for wear and inform the contractor if maintenance is needed
- Check for approved shop drawing, contract drawings and spec requirements
- Review the materials delivered to the site against specs and shop drawings for conformance, correct storage and the manufacturer's recommended installation procedure
- Check all printed/painted signage for correct spelling, colors and size of text
- Delivered signage must match approved shop drawings

8. Landscaping

- Consult with maintaining agency prior to work and during installation to coordinate inspection responsibilities
- Check bed preparation requirements in advance
- Check plant ID labels against plan requirements (661.03)
- Attach delivery tickets to IDR
- Review special soil/fertilizer/planting/mulching requirements
- All deciduous plants must be planted after September 15 and before June 1 (661.06)
- Replacement plants must also be planted between these dates (661.06)
- All plants shall be under the Contractor's care for the period of establishment
- The period of establishment begins immediately at planting and continues until October 1 and shall be no less than one growing season: June 1 to October 1 (661.17)
- Contractor's care includes watering, remulching, restaking, weeding, etc. (661.17)
- Landscape watering may be a separate pay item (662); consult project specs

Section 3.0

Pavement Repair and Bases

1) Partial Depth Pavement Repair (ODOT 251) Rigid and Flexible

- This work consists of partial depth removal of deteriorated existing pavement, applying tack coat and placing and compacting asphalt concrete (403 & 404)
- Review drawings and specifications for special notes
- Verify that JMF (Job Mix Formula for asphaltic cement concrete) is approved
- Partial depth repair is the first operation after grinding, if quantity exceeds 2% of pavement area contact Engineer.
- Check that traffic control is adequate and complies with MOT plan
- The Inspector will mark the areas to be removed. Typically these areas will be rectangular
- Verify that contractor has removed all of deteriorated existing pavement and the hole has been vacuumed and is clean.
- If partial depth repair exceeds 5" in depth, the hole shall be cleaned and filled with asphalt and paid as partial depth repair. Later this area will be repaired with full depth pavement repair and flexible replacement.
- Verify that tack has been placed on sides and bottom of hole before asphalt is placed
- Asphalt should be flush with existing pavement after compaction.
- Patch should be cool (under 180 degrees) before area opened to traffic
- Pay quantity is measured in Square Yards and must be documented on partial depth sheets, which will be attached to IDR along with asphalt tickets

2) Full Depth Rigid Pavement Removal and Flexible Replacement (ODOT 252)

- This work consists of full depth removal of deteriorated existing rigid pavement, applying tack coat and placing and compacting asphalt concrete (301)
- Review drawings and specifications for special notes
- Verify that JMF is approved
- Contact testing agent
- Check that traffic control is adequate and complies with MOT plan
- The Inspector will mark the areas to be removed. Typically these areas will be rectangular with minimum width of 4 ft. This operation typically occurs before grinding.
- Verify that contractor has saw cut the full depth of existing pavement.
- At the beginning of operation, testing shall be done, checking to insure patch compacted to 92% of maximum JMF density. The rolling pattern shall be consistent throughout the entire contract.
- Verify that pavement has been excavated to adequate depth (minimum 12") and that sub grade has been compacted and properly graded. If necessary to remove unstable material subgrade, the additional excavation and compacted granular material are separate pay items
- If voids or other unusual conditions are discovered contact Engineer
- Verify that tack has been placed on sides of hole before asphalt is placed
- The asphalt should be placed in two or more lifts (6 in maximum) and each lift compacted with a 1-3 ton roller with entire area of patch receiving a minimum of 18 passes of the roller
- On surface course of the patch, the entire edge of the patch shall be compacted before the center is compacted.
- Asphalt should be flush with existing pavement after compaction.

- All pavement excavated for full depth repair shall be filled with asphalt by the end of the work day
- Patch should be cool before area opened to traffic
- Pay quantity is measured in Square Yards and must be documented on full depth sheets, which will be attached to IDR along with asphalt tickets

3) Pavement Repair (ODOT 253)

- This work consist of full depth removal of deteriorated existing flexible pavement, applying tack coat and placing and compacting asphalt concrete (301)
- Review drawings and specifications for special notes
- Verify that JMF is approved
- Contact testing agent
- Check that traffic control is adequate and complies with MOT plan
- The Inspector will mark the areas to be removed. Typically these areas will be rectangular with minimum width of 4 ft. This operation typically occurs before grinding.
- At the beginning of operation, testing shall be done, checking to insure patch compacted to 92% of maximum JMF density. The rolling pattern shall be consistent throughout the entire contract.
- Verify that contractor is removing pavement in a manner that does not displace, undermine or otherwise damage pavement.
- Verify that pavement has been excavated to adequate depth (12" minimum) and that sub grade has been compacted and properly graded. If necessary to remove unstable material subgrade, the additional excavation and compacted granular material are separate pay items
- If voids or other unusual conditions are discover contact Engineer
- Verify that tack has been placed on sides of hole before asphalt is placed
- The asphalt should be placed in two or more lifts (6 in maximum) and each lift compacted with a 1-3 ton roller with entire area of patch receiving a minimum of 18 passes of the roller
- On surface course of the patch, the entire edge of the patch shall be compacted before the center is compacted.
- Asphalt should be flush with existing pavement after compaction.
- All pavement excavated for pavement repair shall be filled with asphalt by the end of the work day
- Patch should be cool before area opened to traffic
- Pay quantity is measured in Square Yards and must be documented on full depth sheets, which will be attached to IDR along with asphalt tickets

4) Pavement Planing (ODOT 254)

- This work consist of planing the existing pavement and removal of grindings
- Review drawings and specifications for special notes
- Contact Traffic Operations (352-3744) one week before grinding if loop detectors are present
- Check that traffic control is adequate and complies with MOT plan
- The Inspector will mark the limits of the areas to be removed.
- Verify that contractor is removing proper depth of pavement
- Verify that contractor has thoroughly cleaned area planed and tacked and wedged, driveways, handicap ramps and castings to proper diameter before road is opened to traffic. The cost of wedging is included in the price of pavement planing.
- All joints with existing pavement shall be butt joints. Joints over 1 in. in depth shall be tacked and wedged
- Areas of the planed surface that are unsound or spalled shall be cleaned of loose material. Then patched with asphalt level with surrounding pavement. These areas shall be measured in Square Yards and paid as patching planed surface.

- Verify that contractor has installed temporary paint striping per specifications and drawing by the end of the workday.
- Sidewalks, inlets and handicap ramps shall be cleaned of any grindings.
- Grinding shall be disposed of according to ODOT CMS 203.05
- Pay quantity is measured in Square Yards based on measurement by survey crew. IDR quantity will be estimate obtained by field measurement of Inspector

5) Full Depth Rigid Pavement Removal and Rigid Replacement (ODOT 255)

- This work consists of full depth removal of deteriorated existing rigid pavement, installing dowels and placing Portland cement concrete
- Contact testing agent to make 4 cylinders, air, slump and temperature
- Review drawings and specifications for special notes. Note type of concrete to be used.
- Check that traffic control is adequate and complies with MOT plan
- The Inspector will mark the areas to be removed. Typically these areas will be rectangular with 6ft minimum width
- Verify that contractor has saw cut the full depth of existing pavement with diamond saw.
- Verify that pavement has been excavated to adequate depth and that sub grade has been compacted and properly graded If necessary to remove unstable material subgrade, the additional excavation and compacted granular material are separate pay items
- Reference ODOT standard drawing BP 2.5 to insure that joints and dowels are properly installed.
- Verify that dowel holes are proper depth and skew and are blown out before dowels are grouted in. If edge of pavement is unsound, contact Engineer
- The patch shall be cast as one continuous pour and vibrator shall be used. The patch shall receive the same finish as the surrounding pavement
- The patch shall be screeded longitudinal if under 12 ft in length or perpendicular to centerline if over 12 ft in length.
- Curing compound shall be used
- Concrete shall be properly cured (7 days or 5 days & cylinder break of 75% of design strength) before it is opened to traffic.
- Pay quantity is measured in Square Yards and must be documented on full depth sheets, which will be attached to IDR along with concrete tickets

6) Aggregate Base Course (ODOT 304)

- This work consists of furnishing, placing, compacting one or more courses of aggregate at grades shown in the plans for use as pavement base
- Review drawings and specifications for type, total thickness, maximum lift thickness (6 in maximum), and compaction requirements.
- Contact testing agent and arrange for stockpile sampling and testing for proper density. If contractor is having problems achieving proper density contact Engineer.
- Check that subgrade is at proper grade and compaction
- Check that material is coming from an approved source
- Get copy of each delivery ticket and attach to IDR
- Check that each layer meets grade, thickness and compaction requirements with special attention to areas near castings or other obstructions including edge of pavement.
- Material shall be spread by self propelled spreading machine if area is greater than 2000SY
- Pay quantity is measured in Cubic Yards. See ODOT CMS 304.07 for conversion from tons to cubic yards.

7) Portland Cement Concrete Base (ODOT 305)

- This work consists of constructing a portland cement concrete on a prepared subgrade or base course .
- Follow the procedures of 452 except
 - Curing applied 1 gallon/ 200 SY
 - Only transverse joints are sealed
 - Surface is not grooved, broom only
 - Surface tolerance is ¼" per 10'
- Pay quantity is measured in Square Yards and adjusted by final survey.

Section 4.0

Concrete Pavement

1) Plain Portland Cement Concrete Pavement (ODOT 452)

- This work consists of constructing a pavement composed of portland cement concrete on a prepared subgrade or base course.

A) Before concrete is placed

- Review drawings and specifications for special notes. Note type of concrete to be used and joint spacing (Get copy of ODOT standard drawings BP-2.1 through 2.5).
- Contact testing agent
- Verify that subgrade has been compacted and properly graded by checking against survey stakes. If necessary to remove unstable material subgrade, the additional excavation and compacted granular material are separate pay items
- Concrete can be placed either in forms or by slip form machine.
 - A) Forms
 - 1) Verify that steel forms are straight and are same depth as proposed pavement.
 - 2) Forms must have locking end joints
 - 3) Forms must be clean and oiled each time they are used
 - 4) Forms are to be set on grade with compacted material under its entire length. Shimming is prohibited.
 - 5) Check grade of form against survey stakes immediately before placing concrete
 - 6) Radius
 - a) Over 200' use 10' straight sections to make curve
 - b) 100' to 200' use 5' straight sections to make curve
 - c) Less than 100' use curved steel forms or wood
 - B) Slip form machine
 - 1) Verify that grade stakes are correct immediately before placing concrete
 - 2) If machine automatically grades subgrade verify that subgrade is recompactd
- Verify that subgrade is moistened before the concrete is placed
- Verify that all embedded items have been installed (conduit, anchor bolts, sleeves, etc)
- Verify all castings have been blocked out.
- Meet with contractor to insure concrete tickets will include the information on batch weights and water used.
- Verify lighting in place if night work is forecast. Lights required for any concrete placed at night.
- Verify subgrade and forms free of frost and not frozen

B) During concrete placing

- Concrete must be vibrated with internal vibrator
- Concrete will be leveled off with vibrating screed or slip form machine. Verify that vibration of screed is within specifications
 - 1) Joints
 - Review ODOT standard drawing BP-2.5
 - All transverse joints shall be perpendicular to centerline unless directed otherwise
 - Concrete near joints must be placed with care to avoid damaging joint and concrete near joint must be vibrated with internal vibrator. Concrete is not to be discharge directly on joint.

- Longitudinal joints can be sawed or formed.
 - Dowels can be placed in baskets or by mechanical means. The free end of the dowel shall be coated with bond breaking substance. If basket is used, it shall be held firmly in place with steel pins and retaining wire removed
 - Pressure relief joints are to be placed near each bridge per ODOT standard BP 2.4. Consult with Engineer for additional details
 - Contraction joints are continuous for the width of the pavement and are to be a minimum of $\frac{1}{4}$ pavement thickness.
 - Construction joints shall be used at the end of the day or when work halts for 30 minutes or longer. Dowels are required in construction joints
 - Joints are to be cut as soon as pavement has cured enough to prevent raveling of surface of the concrete.
 - Contraction joints are spaced 15 ft maximum.
 - Construction joints are minimum of 6 ft from contraction joint
- Surface of the pavement shall be checked with 10 ft straight edge $\frac{1}{8}$ " in 10 ft
 - The edge of the pavement shall be finished with radius tool.
 - The pavement shall receive a broomed finish in the longitudinal direction then be grooved in the transverse direction as per 451.09 except no stations in pavement. Gutter plate is not to be tined.
 - No additional water is to be added to surface of concrete to aid in finishing.
 - Collect concrete tickets to verify concrete type. Tickets are attached to IDR
 - Minimum concrete test include 4 cylinders, air, slump and temperature/100 CY. Consult with Engineer if additional tests are required.
 - Follow ODOT CMS section 499 for additional concrete requirements

C) After Concrete has been placed

- Immediately after the finishing operations have been completed and after the free water has disappeared, all exposed surfaces of the concrete shall be sealed by spraying a continuous uniform film of curing compound without marring the surface of the concrete.
- Curing compound shall be used at rate of 1 gal per 150 SF minimum. Do not mix colors of curing for duration of project.
- If temperature is expected to go below freezing, pavement must be protected from the cold with blankets or other means.
- No equipment except finishing equipment can be placed on pavement until it reaches the proper strength.
- Honeycombed areas shall be corrected immediately after the forms are removed.
- Surface of the pavement shall be checked with 10 ft straight edge $\frac{1}{8}$ " in 10 ft. If pavement is ground because of surface variations, the grinding machine shall be self propelled and capable of grinding the concrete without spalling the pavement. The transverse grooves must be reinstalled with machine with diamond blades designed for this task.
- The joints in the pavement shall be sealed before the pavement is used.
 - Joints shall be cleaned immediately before applying sealer.
 - Joints must be dry to be sealed.
 - Transverse contraction joints shall be sealed with a one piece preformed material. The seal shall be lubricated on both sides and when installed be $\frac{1}{4}$ " below level of pavement.
 - Expansion and longitudinal joints shall be filled with hot asphalt meeting 705.04
- Concrete shall be properly cured for 7 days before it is opened to any traffic. The pavement may be opened in 5 days(3 days in high early concrete is used) if the cylinders break at 75% of design strength
- Pay quantity is measured in Square Yards and will be adjusted based on final survey quantity.

Section 5.0

Asphalt

1. Bituminous Aggregate Base (ODOT 301)

- This work consists of placing bituminous aggregate and compacting it at grades shown on the plans for use as pavement base.
- Follow the general guidelines of item 448.
- Review drawings and specifications for type, total thickness, maximum lift thickness (6") and compaction requirements.
- Second lift should not be placed until first lift is sufficiently cooled.
- Contact testing agent.
- Check that aggregate base is at proper grade and compaction.
- Verify that JMF is approved.
- Verify that all utilities, conduit and drainage have been properly installed.
- Check ground temperature to assure it is within proper range.
- Verify contractors contingency plan if there is a chance of poor weather.
- Obtain a copy of each delivery ticket and attach to IDR.
- Verify that material is being placed at proper temperature range.
- Check that each layer meets grade, thickness and compaction requirements with special attention to areas near castings or other obstructions.
- Pay quantity is in cubic yards per 401.17. (Pay quantity to be paid at a ratio of 2 tons to 1 cubic yard) Pay quantity should not exceed plan quantity unless authorized by the engineer.

2. Asphalt Concrete (ODOT 448)

- This work consists of constructing a surface course or an intermediate course of aggregate and asphalt cement mixed in a central plant and spread and compacted on a prepared surface.
- The Inspector should be on site during all placement operations.

A. Before Asphalt is Placed:

- Review contract specifications and drawings (JMF, quality control report, traffic control, etc.).
- *Contractor to supply copy of Quality Control Plan*
- The contractor will develop a JMF to comply with composition limits and mix design criteria and submit to the City's testing agent and engineer for approval. The contractor will submit a JMF for items 448 and 301.
- Verify that proper documents for recording are at site (asphalt logs).
- Verify that the prepared surface is cleaned and maintained free of accumulations of materials that would interfere with the spreading operation and/or contaminating the mixture.
- Verify that improperly placed wedges are removed prior to paving.
- Verify that butt joints are straight and squared off.
- Verify that where pavement courses or subgrade becomes loosened, rutted or defective, the deficiency is corrected in accordance with the requirements of the item or items involved prior to spreading of the asphalt mixture.
- Verify that all surfaces such as gutter plates, manholes, valve chambers, and other structures are painted with a thin uniform coating of tack meeting the requirements of item 702, prior to the asphalt mixture being placed against them.
- Verify the locations of all castings.
- Verify that all inlets openings are covered prior to asphalt paving. In the event that asphalt has dropped into the inlets, require contractor to remove all asphalt debris immediately.
- Verify that prepared surface is dry and weather conditions are such that proper handling, finishing and compaction can be accomplished. Refer to Item 401.05 for minimum surface and ambient temperature requirements. Consult engineer if weather conditions are not dry.
- Verify that the asphalt-leveling course has adequately addressed grade conflicts in order to meet final grade. Consult engineer or surveyor if needed.

- The contractor is to use spreading equipment that is self-contained and of sufficient size, power and stability to receive, distribute and strike off the asphalt mixture.
- The spreading equipment will have automatic control systems when grades are critical.
- Verify that spreading equipment is heated and ready to go.
- There should be a breakdown roller and finish roller on site meeting the requirements of 401.11.
- Verify that 'No Parking' signs are installed in a timely manner. (Streets are to be posted at a minimum of 14 hours in advance per CMC 508-12 and Procedures for Posting No Parking Signs 2/6/03)
- If police services are needed to assist in traffic control and parking enforcement, verify in advance that contractor has contacted the police district for availability.
- Contact testing agent 24 hours in advance prior to asphalt paving.

B. During Asphalt Paving:

- Prior to placing a surface course onto an intermediate course, the contractor will apply a tack coat on the intermediate course (407.052).
- Prior to placing an intermediate course, the contractor will apply a tack coat on the planed surface. The contractor will not apply tack coat to severely raveled or disintegrated pavement.
- Tack coat is uniformly applied at an application rate of 0.10 gallons per square yard. (Approximately 90-95% coverage should be achieved, do not over tack, watch for puddles)
- All transverse joints are to be thoroughly cleaned and have tack coat applied.
- The contractor is responsible for removing tack-coated aggregates in the event it has tracked onto other streets.
- Hand raking is permitted where the spreading equipment is impractical due to size or there are irregular areas to be paved.
- Where curb heights are low (less than 3"), the placement of the intermediate course on residential streets will terminate 12 to 24 inches from the face of curb to maximize curb reveal per standard drawings.
- One copy of the plant ticket will be obtained for each load delivered to the paver and logged. Several streets may be paved in a one-day production.
It is important to record on the asphalt plant ticket which street the ticket represents.
- Asphalt plant tickets should be attached to the IDR.

C. Spreading and Compaction

- If an asphalt mixture is being delivered by a haul truck that dumps it directly into the paver, the truck should stop just short of the paver. The paver should be moving forward when it comes in contact with the truck. The paver should pick up the truck instead of the truck backing into the paver. When raised, the bed of the haul truck should not rest on any portion of the paver.
- Haul trucks should not bump paver at anytime.
- The paver speed should remain constant. The paver should not be operated at a slower-than- normal speed while the truck exchange is being completed. All paver stops during the spreading operation should be avoided, unless the paver is waiting for the next haul truck.
- The amount of mix in the paver hopper should always be kept at a level above the top of the flow gates. Do not allow paver to be emptied while waiting for haul trucks.
- Keep haul trucks off of newly placed asphalt mat.
- All haul trucks must be covered to help maintain the desired asphalt temperature and reduced any chances of significant temperature loss.
- The asphalt mixture will be compacted by a breakdown roller as soon as the temperature of the asphalt mixture is sufficient for roller coverage. (Blue smoke coming from the asphalt mixture usually means that it is too hot.)
- Verify that the proper thickness of asphalt is being achieved. (1-1/4" placed uncompacted to get 1" compacted)
- Keep breakdown roller as close to the paver as possible when adequate compaction temperatures exist.
- Breakdown roller should move in the direction of the paver.
- Roll cold longitudinal joints first with the breakdown roller on majority of the new mat.

- The most effective way to compact a longitudinal joint is to place the breakdown roller on the hot mat and overlap the joint by a distance of 6" over the cold mat.
- Roll curb line and work towards the middle of the asphalt mat.
- The temperature of the asphalt mixture during production ranges from 265 – 350°F. The temperature of the actual asphalt mixture will be maintained within the ranges of the JMF.
- Compaction must be accomplished before the asphalt mixture cools to a temperature below 175-185°F.
- Ask testing agent to run temperature checks on the asphalt mixture.
- Hand tampers should be used in areas where rollers are not accessible.
- The finish roller is used to smooth out roller marks and improve the smoothness of the pavement.

D. Testing (per ODOT 2002 CMS Spec 448)

- *The Contractor is responsible to perform tests per 441.09. These tests are: AC Content, Gradation, Air Voids and Maximum Specific Gravity (MSG). One sample per ½ day paving.*
- *City to perform Verification Acceptance (VA) test. One test per 4 days of paving. VA tests are: AC content, and Gradation. VA tests are compared to contractor's tests per table 403.06-1. If test are within acceptable limits pay factor is adjusted per 403.08.*
- *The City is responsible for testing asphalt density, per special provision 401.16.*
- *For initial density tests, use MTD as determine by the JMF. To verify actual MTD the City is required to take Bulk Density sample to determine Maximum Specific Gravity (MSG), one per each day paving. Perform MSG Test per ASTM D2041. Maximum Theoretical Density is average of MSG results.*
- *The inspector should meet with the testing agent during paving concerning frequency and location of testing.*
- *Density readings should be taken every 50 feet.*
- *Nuclear gauge readings should be taken after each pass of each roller, and the rate of increase in density after each pass determined.*
- *A correction should be made to compare the theoretical maximum density to the actual in-place density. The actual in-place density will be used in the subsequent paving days. This value will be used to compute pay quantities and compute density results.*
- *The theoretical maximum density is when there are no air voids and 100% compaction is achieved.*
- *The required compaction is achieved when the density ranges from 92-95.9% of the maximum theoretical density as indicated by the samples obtained by the City.*
- *Pay quantity is in cubic yards per 401.17. (Pay quantity to be paid at a ratio of 2 tons to 1 cubic yard) Pay quantity should not exceed plan quantity unless authorized by the engineer.*
The asphalt pay factor will be determined based on the acceptance tables 403.08-1 and 403.08-2. Pay is also adjusted at the end of a paving season for Asphalt Binder Price Adjustment per 401.20.

F. After Asphalt Paving

- Verify that all butt joint surfaces are sealed
- Verify that all gutter edges are sealed
- Avoid sealing at handicap ramps, inlets and castings.
- Verify that temporary striping is placed properly.
- Verify that any traffic control devices not needed are removed.
- Verify that 'No Parking' signs are removed.
- Verify that all asphalt debris is removed, especially at sidewalks, inlets and driveways.
- Obtain permanent striping plans and verify with Traffic Engineering of layout prior to permanent placement.

G. Quality Control (ODOT 441)

- The contractor will develop a quality control program for design and controls of the asphalt mixture in accordance with 441.
- The contractor may begin production of the asphalt mixture once an approval is obtained.
- During the production of the asphalt mixture, the contractor will perform quality control procedures to verify that the asphalt mixture delivered to the paving site is in reasonable conformance with the limits set in the approved job mix formula.
- The contractor will submit a report to the engineer and testing agent of the results of the quality control measures taken following the completion of production of each acceptance lot.
- The contractor is required to take one (1) marshal sample for each half-day of paving.
The contractor is required to test for the following:
 1. Bitumen content
 2. Gradation
 3. Air Voids – MSG test per ASTM D 2041 and Marshal test
 4. Voids in mineral aggregate*Submit test results on TE-199 report.*

Section 6.0

Concrete

1) Concrete (ODOT 499)

- This work consists of proportioning and mixing portland cement concrete
- Review drawings and specifications for special notes – check for modified mix design.
- Verify that concrete mix design is approved – check type of mix required – i.e. Class C, Class S, Class MS, Class FS
- The water-cement ratio in mix design shall not exceed maximum specified.
- Additional water up to one gallon per cubic yard of concrete may be added at jobsite to adjust the slump or air content, provided this is done prior to discharging any of the batch and within the time limitations. When making these adjustments, the concrete shall be mixed a minimum of 30 revolutions at mixing speed. Retempering after the start of discharge is not acceptable. Record amount of water added on batch ticket. The addition of any additional water (above the one gallon per cubic yard) needs to be approved by Engineer before adding.
- Testing of concrete – in general – concrete delivered to site should be tested as follows
 - Air Test – verify within limits
 - Slump Test – verify within limits
 - Temperature Taken – verify within limits
 - Fabricate cylinders for strength tests
 - Minimum 4 cylinders per test
 - 1 Seven Day Break
 - 2 Twenty Eight Day Breaks
 - 1 Hold Cylinder – to be broken if problems with other cylinders.
- Concrete shall contain 6 (\pm 2) percent of total air as determined by field tests of fresh concrete.
- Concrete shall have a slump of approximately 1-4 inches with a maximum slump not to exceed 5 inches as determined by field tests of fresh concrete.
- Concrete shall have a temperature of between 50° and 70°F, determined by field tests, as delivered.
- Discharge of concrete shall be completed within 60 minutes after batching (as determined on the batch ticket) unless an approved set-retarding or a water –reducing and set-retarding admixture is used, then discharge of concrete shall be completed within 90 minutes of batching.
- Non-conformance of any of the items above – air content, slump, temperature, time – is just cause to reject that load of concrete. Notify engineer if material is rejected.
- Tickets for all concrete placed shall be collected and attached to IDR with proper labeling of bid item used for.

2) Concrete Placement

- This work consists of placing portland cement concrete in general.
- Inspector should be on site for concrete placement – this is a critical item that needs special attention.

A) Before placement

- Verify that the supplier and mix design has been approved.
- Verify that the contractor has proper placing and finishing tools.
- Verify that reasonable weather is predicted for the day of the concrete placement.
- Set up any testing prior to concrete delivery.
- Verify and coordinate proper joint placement and joint patterning.

- Formwork:
 - Review the contract drawings, specifications, shop drawings and any standard drawings for the proposed work.
 - Verify that the lines and levels of the formwork are as required, and that embedded inserts and blockouts are installed. If necessary, contact survey crew.
 - Check forms have been cleaned from previous use.
 - Verify all debris is removed from formwork –
 - Verify forms are oiled before use
- Reinforcement:
 - Verify size, length, lap splice distance, spacing, supports, ties are per specifications
 - Check epoxy coated bars for continuous coating – touch up with epoxy on scrapes and cut ends.
- Embeds:
 - Verify proper placement of all embeds shown on plans.

B) During placement

- Collect batch tickets from pour and record on IDR.
- Verify on batch ticket proper concrete mix.
- Coordinate proper test procedures with testing agent.
- Concrete is to be placed as close as possible to its' final location – not to be moved with vibrator.
- Vibrate all concrete – insure that proper vibration is being accomplished throughout concrete pour.
- Concrete pour is to be stopped at a joint (expansion joint, contraction joint, or approved construction joint). If problems develop between joints and pour cannot continue in approved method, consult engineer.
- Construction joints shall be vertical and aligned with finishing pattern.
- If rain starts during concrete pour – stop pour and protect material in place. Pour can continue if rain stops. Contractor is responsible for materials placed until accepted by City.
- Verify proper concrete finishing per specifications or standards – no water shall be added to surface during finishing.

C) After placement

- All concrete gets cured (see next section for reference).
- Verify protection of new concrete during curing period – hot weather, cold weather, adverse weather (rain, wind, direct sun).
- Removal of forms – forms can be removed when concrete has hardened sufficiently that it will not be damaged. If forms are removed before 7 days – all exposed edges are to be cured properly.
- Concrete surface repairs – repair concrete areas (including honeycomb areas) by proper technique, immediately after form removal.
- Insure concrete has achieved proper strength before placing into service.

3) Curing

- This work is incidental to any and all concrete work.
- Proper curing is critical to extended life of concrete
 - Surfaces are to be maintained continuously moist
 - Favorable temperature is between 40° and 80°F
 - Begin curing immediately after finishing operations are complete and the surface will not be marred.
 - Length of curing – under normal conditions – 7 days.
- Check application of curing compound for uniformity, application rate and timely placement

- Types of curing: Review specifications for specific curing method
 - Water cure – continuously wet condition – generally burlap. Care must be taken not to let the coverings dry out and absorb water from the concrete. The edges should be lapped and the materials weighted down so that they are not blown away.
 - Membrane cure – check manufacturer instructions for rate of application. Must conform to ODOT specifications. Apply directly to finish surface after all water on the surface is gone. Type of curing to be consistent throughout job (not mixing of clear and white curing compound).
 - Cover cure – seal in surface conditions. The edges should be lapped and the materials weighted down so that they are not blown away.

4) Cold Weather Concreting (ODOT 511.12 and ACI 306)

- This work consists of placing portland cement concrete when temperatures are 32° or below
- Review with engineer and contractor all procedures for cold weather concreting.
- The subgrade, steel, and forms shall be above 32°F and entirely free of frost.
- High-Low thermometers are to be supplied by the contractor. Check temperatures on a regular basis and record temperatures on IDR.

5) Hot Weather Concreting (ACI 305)

- This work consists of placing portland cement concrete when high temperatures require special precautions be taken to ensure proper handling, placing, finishing and curing.
- High temperature, high wind velocity, and low relative humidity can affect fresh concrete in two ways: 1) the high rate of evaporation may induce plastic shrinkage or drying shrinkage cracking, 2) the evaporation rate can remove surface water necessary for hydration unless proper curing methods are employed.
- Thermal cracking may result from rapid drops in the temperature of the concrete, such as when concrete is placed on a hot day followed by a cool night.
- Recognize the factors that effect concrete and plan to minimize their effects.
- Concrete temperature shall not exceed 90°F. On hot days, this can be achieved by use of approved admixtures.
- When ambient air temperatures exceed 90°F – discharge of concrete shall be within 60 minutes after batching.

6) Concrete For Structures (ODOT 511)

- This work consist of furnishing and placing portland cement concrete including reinforcing steel in reasonably close conformity with the lines, grades and dimensions shown on plans.
- Materials shall conform to ODOT 499.
- Review Plans and specifications.
- Review permissible tolerances of measurement.
- Review contractors' equipment, organization and methods. Review concrete placement method.
- Review testing requirements – set up as needed.
 - Concrete cylinders shall be taken – minimum 4 cylinders per 100 cubic yards of concrete placed. Minimum one set per day - consult engineer for frequency.
 - If early form removal is desired, additional cylinders may be required.
- No superstructure concrete shall be placed if the ambient air temperature is 85° or higher or predicted to go above 85° during the concrete placement.
- Concrete for structures must be maintained between 50° and 100°F, including fresh concrete and for seven days when using Class C concrete. The concrete temperature

- can be reduced a maximum of 20° per day until the atmospheric temperature is reached after the seven days.
- Formwork – check tightness, location, alignment, plumbness, elevations, dimensions, cleanliness and stability. Formwork shall be securely braced. All exposed edges shall be chamfered.
 - Rebar – check condition, cleanliness, size, steel grade, length, number, splicing, form clearance, support, bar ties, lap, embedment clearance and surface clearance. Confirm or verify with engineer any adjustments to rebar such as cutting, spacing and positioning. Reinforcing shall be securely and rigidly tied and shall be accurately located in the forms so as to maintain the location and clearances shown on the Plan.
 - Concrete shall be placed to insure against segregation, shall be deposited as near as possible to its final position, concrete shall not be dropped more than 5 feet. Mechanical vibration is required.
 - Construction joints shall be placed at predetermined locations, either shown on the plans or determined by the structural engineer.
 - Curing is required and shall be by a method approved by structural engineer.
 - Surface finish of formed surfaces per contract special provisions (ODOT 511.15).
 - Bridge deck roadway finish per 451.09 and 451.12. A finishing machine shall be used unless approved by engineer on small areas. Finishing machine per ODOT 511.16.
 - All holes and voids in concrete shall be patched regardless of whether the void or hole is above or below finished grade.
 - Patching shall be performed prior to finishing and sealing the concrete surface. Test patches shall be performed in locations to be covered by soil to verify that patch material matches adjacent concrete color and texture.
 - See 511.14 to determine how long concrete shall cure before removing forms and opening structure to traffic.
 - Pay quantity is measured in Cubic Yards of a specified Class of concrete determined by calculations from plan dimensions, in place, completed and accepted. This is to be recorded on the IDR.
 - Reinforcing steel and all other incidentals associated with reinforcing steel shall be incidental in the price bid for structural concrete.
 - No deduction will be made for the volume of the reinforcing steel, conduits, structural steel, embedded items or concrete piles.

7) Pier Wall Construction

- This work consists of placing portland cement concrete for pier wall construction.
- Review Plans and specifications.
- Review permissible tolerances of measurement.
- Review contractors' equipment, organization and methods.
- Review testing requirements – set up as needed.
- Verify diameter, length and soil conditions of pier.
- Check layout for correct location.
- Review overhead and underground utilities to verify that they are out of way.
- Review subsurface exploration log with geotechnical engineer and anticipate drilling characteristics.
- Obtain minimum depth. Contact geotechnical engineer if depth varies significantly from plan.
- During drilling check alignment, grade and plumbness of shaft.
- Record soil conditions and placement procedures on Log Sheet or Calculation Sheet and attach to IDR.
- Formwork – check tightness, location, alignment, elevations, dimensions and stability. Formwork shall be plumb and securely braced so that the centerline of the top of the pier is within 1" of the Plan location.

- Rebar – check condition, cleanliness, size, steel grade, length, number, splicing, form clearance, support, bar ties, lap and embedment clearance. Confirm or verify with engineer any adjustments to rebar such as cutting, spacing and positioning. Reinforcing cages shall be securely and rigidly tied and shall be accurately located in the forms and drilled shaft and adequately blocked, so as to maintain the location and clearances shown on the Plan.
- Check for any inserts and verify placement.
- Concrete shall be placed the same day of drilling pier. Concrete shall not be dropped into the drilled piers or forms, but shall be carefully placed in a compacted mass. Mechanical vibration shall be required. Care shall be taken not to dislocate the reinforcement during concrete placement. Concrete placement shall be continuous from bottom of pier to top and no construction joint shall be permitted. Piers shall be “crowned” so as to prohibit ponding of water on top of the pier.
- The Contractor shall not excavate for placement of precast panels and porous backfill until the pier concrete has attained at least 75% of design strength. Verify ‘Near Face’ of precast is the exposed face.
- The Contractor shall backfill the trench behind the pier wall within 48 hours after the excavation is completed (this includes placement of precast panels, porous backfill and embankment).

8) Bridge Construction

- This work consists of placing portland cement concrete for bridge construction.

A) Construction Joints (511.09)

- Check plans for location of construction joints.
- The Engineer shall approve construction joints proposed by contractor not shown in plans.
- All construction joints shall be made with bulkheads provided with keys which clear all exposed surfaces approximately one-third the thickness of the joint.

B) Curing and Loading

- See 511.14 to determine how long concrete shall cure before removing forms and opening structure to traffic.

C) Foundations

- See ODOT CMS Item 507 for construction of bearing piles.
- If foundation is on piles, verify location of piles are within tolerances described in 507.10.
- If foundation is placed on soil, contact geotechnical engineer to verify capacity of soil.
- Verify that foundation area is dry before placing concrete.

D) Abutment and Piers

- Review plans and specifications for correct concrete finish.
- All holes and voids in concrete shall be patched regardless of whether the void or hole is above or below finished grade.
- Patching shall be performed prior to finishing and sealing the concrete surface. Test patches shall be performed in locations to be covered by soil to verify that patch material matches adjacent concrete color and texture.
- Verify reinforcing steel placement accuracy in pier caps and abutment seats to avoid future anchor bolts installation.

E) Decks

- Before placing concrete, all forms and structural steel that will be in contact with the concrete shall be thoroughly cleaned.
- Verify expansion joint armor is placed to plan grade.
- Verify all embedments (conduits, scuppers, etc.) are properly placed.
- Verify evaporation rate and ambient temperature ranges are within tolerances. (511.08)

- Unless approved by the Engineer, concrete for decks shall be placed with a vibrating finishing machine.
- Contractor shall perform “dry run” with finishing machine to check deck thickness, reinforcing steel clearance, embedment interferences, and screed cross-section. Inspector shall record all this information every 25’ and attach to IDR. Adjust forms, reinforcing steel, embedments or screed, if necessary.
- Verify that concrete trucks are appropriately scheduled to complete the concrete placement without cold joints or concrete setting too long in truck.
- Verify that contractor is monitoring bottom of deck while concrete is being placed.
- Verify that reinforcing steel is not being displaced during deck concrete placement.
- Surface of deck shall be grooved in accordance with 451.09 or the plans. A strip 9 to 12 inches wide adjacent to the curb or barrier shall not be grooved but finished by hand.
- Unless otherwise specified in the plans, sidewalk shall be finished with a float to produce a sandy texture.
- Curing of deck is critical. Verify contractor is prepared to cure deck immediately after concrete placement. Inspect deck every day to insure that burlap is wet and plastic is secure with no openings or exposed areas.

9) Architectural Concrete

- This work consists of placing portland cement concrete for architectural character and quality.
- Verify plans and specifications for desired fit, finish, color, texture, etc.
- Architectural concrete takes special attention – be sure it is treated as special.
- Schedule pre-pour meeting to discuss procedure for all aspects of architectural concrete.
- Verify supplier remains the same (with same production procedure) throughout job.
- Colored Concrete
 - Colored concrete mix shall be per project specifications.
 - Coloring agent shall be added and mixed with concrete at the plant.